No. 9300017

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Minnesota Agricultural Experiment Station

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF eighteen YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

SOYBEAN
'Alpha'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this 30th day of November in the year of our Lord one thousand nine hundred and ninety-four.

Attest:

Kenneth A. Evans
Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Mike Espy
Secretary of Agriculture

COPY

FORM APPROVED: OMB 0581-0055, Expires 1/31/91

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) *(as it is to appear on the Certificate)*
Minnesota Agricultural Experiment Station

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NO.
M85-610

3. VARIETY NAME
Alpha

4. ADDRESS *(street and no. or R.F.D. no., city, state, and ZIP)*
University of Minnesota
220 Coffey Hall
1420 Eckles Avenue
St. Paul, MN 55108

5. PHONE *(include area code)*
(612) 625-4211

FOR OFFICIAL USE ONLY

PVPO NUMBER
9300017

FILING
Date: Nov. 10, 1992
Time: 9:15 [X] A.M. [ ] P.M.

FEES RECEIVED
Filing and Examination Fee: $2150.-
Date: Nov. 9, 1992
Certificate Fee: $ 250.00
Date: Oct. 13, 1994

6. GENUS AND SPECIES NAME
Glycine max

7. FAMILY NAME *(Botanical)*
Leguminosae

8. CROP KIND NAME *(Common Name)*
Soybean

9. DATE OF DETERMINATION
November 12, 1991

10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION *(Corporation, partnership, association, etc.)*
State Agricultural Experiment Station

11. IF INCORPORATED, GIVE STATE OF INCORPORATION

12. DATE OF INCORPORATION

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS
J.H. Orf
Department of Agronomy and Plant Genetics, 411 Borlaug Hall
University of Minnesota
1991 Upper Buford Circle
St. Paul, MN 55108
PHONE *(include area code)*: (612) 625-8275

14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED *(Follow INSTRUCTIONS on reverse)*

a. [X] Exhibit A, Origin and Breeding History of the Variety
b. [X] Exhibit B, Novelty Statement.
c. [X] Exhibit C, Objective Description of Variety.
d. [ ] Exhibit D, Additional Description of Variety.
e. [X] Exhibit E, Statement of the Basis of Applicant's Ownership.
f. [X] Seed Sample (2,500 viable untreated seeds). Date Seed Sample mailed to Plant Variety Protection Office _____
g. [X] Filing and Examination Fee ($2,150) made payable to "Treasurer of the United States."

15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? *(See section 83(a) of the Plant Variety Protection Act.)*
[X] YES *(If "YES," answer items 16 and 17 below)* [ ] NO *(If "NO," skip to item 18 below)*

16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
[X] YES [ ] NO

17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?
[X] FOUNDATION [X] REGISTERED [X] CERTIFIED

18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.?
[ ] YES *(If "YES," through)* [ ] Plant Variety Protection Act [ ] Patent Act. Give date: _____
[X] NO

19. HAS THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?
[X] YES *(If "YES," give names of countries and dates)* February 14, 1992 10/11/1994
~~[X] NO~~

20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in section 41, and is entitled to protection under the provisions of section 42 of the Plant Variety Protection Act.

Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT *(Owner(s))*	CAPACITY OR TITLE	DATE
	ASSOCIATE DIRECTOR	11-6-92
SIGNATURE OF APPLICANT *(Owner(s))*	CAPACITY OR TITLE	DATE

Exhibit A

Origin and Breeding History of Alpha Soybean

'Alpha' traces to the F_4 progeny of a F_3 plant harvested from a population that had been advanced by a modified single seed descent procedure from the cross Fayette x McCall. Hill plots of the F_4 seed were screened in the field in Bricelyn, MN against race 3 of the soybean cyst nematode. Bulked seed of the F_4 row was designated M85-610 and was used for screening against race 3 of soybean cyst nematode in the greenhouse and for yield testing in the F_5 (1986). Subsequent tests of strain M85-610 were conducted in Minnesota in the F_6 (1987) and F_7 (1988). In the F_7 generation 50 typical plants were harvested individually to initiate purification for observable traits including greenhouse reaction to race 3 of soybean cyst nematode. In the F_8 (1989), M85-610 was entered in the maturity group I Soybean Cyst Nematode Regional Soybean Test. In 1989, forty plant rows were grown for purification purposes. Fourteen rows appeared uniform for plant and seed characteristics including greenhouse resistance to race 3 of soybean cyst nematode, therefore, seed of these rows were bulked to provide breeder's seed. In the F_9 (1990) and F_{11} (1991), M85-610 was tested in the Uniform Regional Soybean Test Maturity Group I. In the F_{10} (1990-91) all small increase of breeders seed was made in Belize. In the F_{11} (1991) Foundation seed was produced by the Minnesota Foundation seed organization. In the F_{11} (1991) seed was increased and M85-610 was approved for release as Alpha. On February 14, 1992, seed of Alpha was released to registered and/or certified growers in Minnesota. No off-type variants were noted in the seed multiplication process of Alpha over three generations. This variety breeds true and meets certification standards.

Exhibit B

Novelty Statement

'Alpha' is similar to Hardin. Alpha is approximately two days earlier than Hardin. Alpha is resistant to race 3 and moderately resistant to race 1 of the soybean cyst nematode while Hardin is susceptible to both race 3 and race 1 of the soybean cyst nematode. Alpha derives its soybean cyst nematode resistance from PI 88788 through 'Fayette'. Alpha has a yield potential about nine percent lower than Hardin under non cyst nematode conditions. Under soybean cyst nematode infested conditions Alpha outyields Hardin by twenty-three percent. Alpha and Hardin are similar in height. Alpha has a slightly higher lodging score than Hardin. Seeds of Alpha are about 1.2 grams per 100 seeds smaller than Hardin. Alpha has about 1.4 percent higher protein and 1.1 percent lower oil content than Hardin. Alpha is susceptible to race 1 of phytophthora while Hardin is resistant to race 1 of phytophthora.

Data concerning Alpha and Hardin taken from the Uniform Soybean Test I, Northern States 1990-91 (a total of 28 tests for most traits).

Variety	Date mature	Yield bu/a	Height inches	Lodging score	Seed Quality score	Seed Size g/100	Protein %	Oil %
Alpha	9/16	46.2	37	2.7	2.1	14.8	42.0	19.6
Hardin	9/18	51.1	37	2.4	2.0	16.0	40.6	20.7

Data concerning Alpha and Hardin taken from the Soybean Cyst Nematode Test I, infested sites, 1988-89 (a total of 5 tests for most traits).

Variety	Date mature	Yield bu/a	Height inches	Lodging score	Seed Quality score	Seed Size g/100	Protein %	Oil %
Alpha	9/22	36.9	42	3.0	2.1	13.9	41.3	20.2
Hardin	9/24	29.8	43	2.5	2.2	15.1	39.9	21.3

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

EXHIBIT C
(Soybean)

PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MARYLAND 20705

OBJECTIVE DESCRIPTION OF VARIETY
SOYBEAN (Glycine max L.)

NAME OF APPLICANT(S)	TEMPORARY DESIGNATION	VARIETY NAME
Minnesota Agricultural Experiment Station	M85-610	Alpha

ADDRESS *(Street and No., or R.F.D. No., City, State, and Zip Code)*
University of Minnesota
220 Coffey Hall, 1420 Eckles Avenue
St. Paul, MN 55108

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PVPO NUMBER
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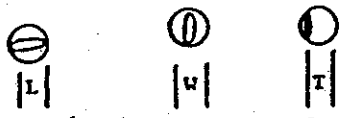
Choose the appropriate response which characterizes the variety in the features described below. When the number of significant digits in your answer is fewer than the number of boxes provided, place a zero in the first box when number is 9 or less (e.g., [0][9]). Starred characters ★ are considered fundamental to an adequate soybean variety description. Other characters should be described when information is available.

1. SEED SHAPE:

[2]



1 = Spherical (L/W, L/T, and T/W ratios = < 1.2)
2 = Spherical Flattened (L/W ratio > 1.2; L/T ratio = < 1.2)
3 = Elongate (L/T ratio > 1.2; T/W = < 1.2)
4 = Elongate Flattened (L/T ratio > 1.2; T/W > 1.2)

★ **2. SEED COAT COLOR: (Mature Seed)**

[1] 1 = Yellow 2 = Green 3 = Brown 4 = Black 5 = Other *(Specify)* _____

3. SEED COAT LUSTER: (Mature Hand Shelled Seed)

[1] 1 = Dull ('Corsoy 79'; 'Braxton') 2 = Shiny ('Nebsoy'; 'Gasoy 17')

★ **4. SEED SIZE: (Mature Seed)**

[1][5] Grams per 100 seeds

★ **5. HILUM COLOR: (Mature Seed)**

[2] 1 = Buff 2 = Yellow 3 = Brown 4 = Gray 5 = Imperfect Black 6 = Black 7 = Other *(Specify)* _____

★ **6. COTYLEDON COLOR: (Mature Seed)**

[1] 1 = Yellow 2 = Green

★ **7. SEED PROTEIN PEROXIDASE ACTIVITY:**

[2] 1 = Low 2 = High

★ **8. SEED PROTEIN ELECTROPHORETIC BAND:**

[2] 1 = Type A ($SP1^a$) 2 = Type B ($SP1^b$)

★ **9. HYPOCOTYL COLOR:**

[4] 1 = Green only ('Evans'; 'Davis') 2 = Green with bronze band below cotyledons ('Woodworth'; 'Tracy')
3 = Light Purple below cotyledons ('Beeson'; 'Pickett 71')
4 = Dark Purple extending to unifoliate leaves ('Hodgson'; 'Coker Hampton 266A')

★ **10. LEAFLET SHAPE:**

[3] 1 = Lanceolate 2 = Oval 3 = Ovate 4 = Other *(Specify)* _____

5

11. LEAFLET SIZE:

[2] 1 = Small ('Amsoy 71'; 'A5312') 2 = Medium ('Corsoy 79'; 'Gasoy 17')
3 = Large ('Crawford'; 'Tracy')

12. LEAF COLOR:

[2] 1 = Light Green ('Weber'; 'York') 2 = Medium Green ('Corsoy 79'; 'Braxton')
3 = Dark Green ('Gnome'; 'Tracy')

★ **13. FLOWER COLOR:**

[2] 1 = White 2 = Purple 3 = White with purple throat

★ **14. POD COLOR:**

[1] 1 = Tan 2 = Brown 3 = Black

★ **15. PLANT PUBESCENCE COLOR:**

[2] 1 = Gray 2 = Brown (Tawny)

16. PLANT TYPES:

[2] 1 = Slender ('Essex'; 'Amsoy 71') 2 = Intermediate ('Amcor'; 'Braxton')
3 = Bushy ('Gnome'; 'Govan')

★ **17. PLANT HABIT:**

[3] 1 = Determinate ('Gnome'; 'Braxton') 2 = Semi-Determinate ('Will')
3 = Indeterminate ('Nebsoy'; 'Improved Pelican')

★ **18. MATURITY GROUP:**

[0][4] 1 = 000 2 = 00 3 = 0 4 = I 5 = II 6 = III 7 = IV 8 = V
9 = VI 10 = VII 11 = VIII 12 = IX 13 = X

★ **19. DISEASE REACTION:** (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)

BACTERIAL DISEASES:

★ [0] Bacterial Pustule (*Xanthomonas phaseoli* var. *sojensis*)

★ [0] Bacterial Blight (*Pseudomonas glycinea*)

★ [0] Wildfire (*Pseudomonas tabaci*)

FUNGAL DISEASES:

★ [0] Brown Spot (*Septoria glycines*)

Frogeye Leaf Spot (*Cercospora sojina*)

★ [0] Race 1 [ ] Race 2 [ ] Race 3 [ ] Race 4 [ ] Race 5 [ ] Other (Specify) _____

[0] Target Spot (*Corynespora cassiicola*)

[0] Downy Mildew (*Peronospora trifoliorum* var. *manshurica*)

[0] Powdery Mildew (*Microsphaera diffusa*)

★ [2] Brown Stem Rot (*Cephalosporium gregatum*)

[0] Stem Canker (*Diaporthe phaseolorum* var. *caulivora*)

19. DISEASE REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant) (Continued)

FUNGAL DISEASES: (Continued)

★ [0] Pod and Stem Blight *(Diaporthe phaseolorum var; sojae)*

[0] Purple Seed Stain *(Cercospora kikuchii)*

[0] Rhizoctonia Root Rot *(Rhizoctonia solani)*

Phytophthora Rot *(Phytophthora megasperma var. sojae)*

★ [1] Race 1 [0] Race 2 [0] Race 3 [0] Race 4 [0] Race 5 [0] Race 6 [0] Race 7

[0] Race 8 [0] Race 9 [ ] Other *(Specify)* _____

VIRAL DISEASES:

[0] Bud Blight (Tobacco Ringspot Virus)

[0] Yellow Mosaic (Bean Yellow Mosaic Virus)

★ [0] Cowpea Mosaic (Cowpea Chlorotic Virus)

[0] Pod Mottle (Bean Pod Mottle Virus)

★ [0] Seed Mottle (Soybean Mosaic Virus)

NEMATODE DISEASES:

Soybean Cyst Nematode *(Heterodera glycines)*

★ [2] Race 1 [0] Race 2 [2] Race 3 [0] Race 4 [ ] Other *(Specify)* _____

[0] Lance Nematode *(Hoplolaimus Colombus)*

★ [0] Southern Root Knot Nematode *(Meloidogyne incognita)*

★ [0] Northern Root Knot Nematode *(Meloidogyne Hapla)*

[0] Peanut Root Knot Nematode *(Meloidogyne arenaria)*

[0] Reniform Nematode *(Rotylenchulus reniformis)*

[ ] OTHER DISEASE NOT ON FORM *(Specify)*: _____

20. PHYSIOLOGICAL RESPONSES: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)

★ [1] Iron Chlorosis on Calcareous Soil

[ ] Other *(Specify)* _____

21. INSECT REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)

[0] Mexican Bean Beetle *(Epilachna varivestis)*

[0] Potato Leaf Hopper *(Empoasca fabae)*

[ ] Other *(Specify)* _____

22. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED.

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant Shape	Hardin	Seed Coat Luster	Hardin
Leaf Shape	Hardin	Seed Size	Weber
Leaf Color	Hardin	Seed Shape	Hardin
Leaf Size	Hardin	Seedling Pigmentation	Hardin

23. GIVE DATA FOR SUBMITTED AND SIMILAR STANDARD VARIETY: Paired Comparison

VARIETY	NO. OF DAYS MATURITY	PLANT LODGING SCORE	CM PLANT HEIGHT	LEAFLET SIZE		SEED CONTENT		SEED SIZE G/100 SEEDS	NO. SEEDS/ POD
				CM Width	CM Length	% Protein	% Oil		
Alpha (Submitted)	9/16	2.7	94	80	119	42.0	19.6	14.8	2.4
Hardin (Name of Similar Variety)	9/18	2.4	94	76	114	40.6	20.7	16.0	2.3

PUBLICATIONS USEFUL AS REFERENCE AIDS FOR COMPLETING THIS FORM:

1. Caldwell, B.E., ed. 1973. Soybeans: Improvement, Production, and Uses. Amer. Soc. Agron. Monograph No. 16.

2. Buttery, B.R. and R.I. Buzzell. 1968. Peroxidase activity in seeds of soybean varieties. Crop Sci., 8: 722-725.

3. Hymowitz, T. 1973. Electrophoretic analysis of SBTI-A_2 in the USDA soybean germplasm collection. Crop Sci., 13: 420-421.

4. Payne, R.C. and L.F. Morris. 1976. Differentiation of soybean cultivars by seedling pigmentation patterns. J. Seed Technol. 1: 1-19.

Exhibit E

Statement of the Basis of Ownership

The Minnesota Agricultural Experiment Station is the owner of Alpha soybean. The Minnesota Agricultural Experiment Station of the University of Minnesota is the employer of the breeder who developed Alpha.